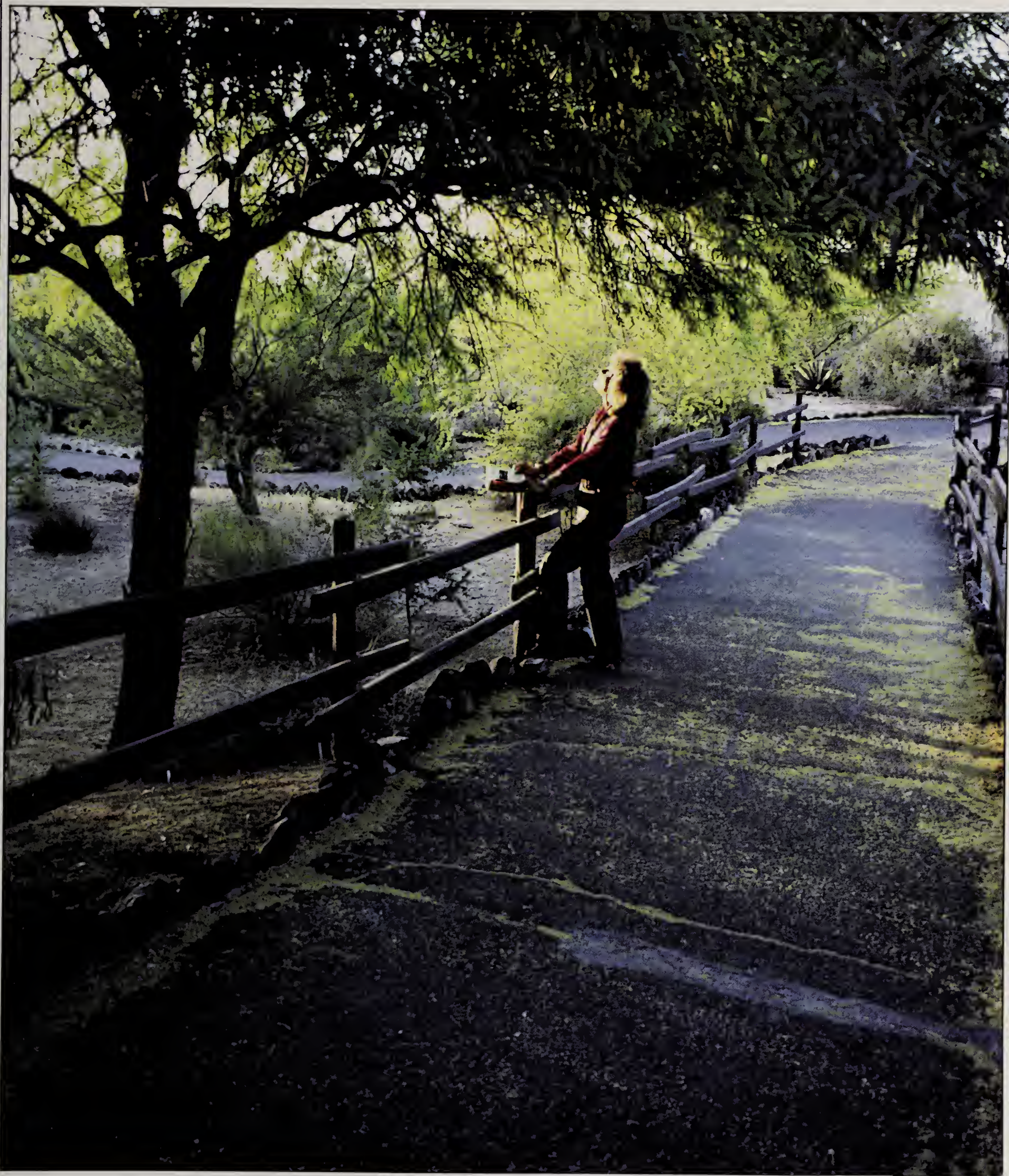


# A · G · A · V · E



Magazine of the Desert Botanical Garden, Phoenix, Arizona

F A L L 1 9 9 0

## BOARD OF TRUSTEES

### OFFICERS

President, Kate Ellison  
President-Elect, Rosellen Papp  
Treasurer, Barry Robinson  
Secretary, Virginia Korte

|                    |                      |
|--------------------|----------------------|
| John Augustine     | Andrew Laubmeier*    |
| Craig Bolton       | Delbert Lewis        |
| Dennis Christensen | Cassandra Mason Motz |
| Roger Davis        | Darryl McIntyre      |
| H. Clifton Douglas | Wm. Howard O'Brien   |
| Fred DuVal         | John C. Pritzlaff    |
| Pat Ebbert*        | Steven Robson        |
| Bradford Endicott  | Evelyn Smith         |
| Alice Feffer       | N. Joel Smith        |
| John Graham        | Milton Sommerfeld    |
| Pamela Grant       | George Tyson         |
| Penny Howe         | Virginia Ullman      |
| William Huizingh   | Judy Walker          |
| Betty Kitchell     | * <i>ex officio</i>  |

### Administration

Executive Director, Robert G. Breunig, Ph.D.  
Assistant Director for Research/Collections,  
Gary P. Nabhan, Ph.D.  
Executive Assistant, Anne Wanner

### Business Office

Director, Mary Settles  
Mary Boyle, Carol Smith

### Development

Director, Sherry New Gillepsie  
Trish Markle

### Community Relations

Director, Sondra Mesnik  
Al Blair  
Kellie Stopp

### Education

Director, Kathleen Socolofsky  
Assistant Director, Patricia Smith  
Exhibits Coordinator, Ruth Greenhouse  
Lynne Schilt

### Research

Curator of Collections, Liz Ecker  
Herbarium Curator/Research Botanist,  
Wendy C. Hodgson  
Research Botanists, Allan D. Zimmerman, Ph.D.  
William Ehrler, Ph.D.  
Research Ecologists, Joseph McAuliffe, Ph.D.,  
Laura Jackson, Ph.D.

### Collections

Data Base Manager, Victor Gass  
Superintendent of Horticulture, Cesar Mazier  
Senior Horticulturist, Judy L. Mielke  
Horticulturists, Patrick Quirk, Cathy Babcock  
Gardeners, David Elliot  
Douglas Mings, John Schluckebier

### Plant Events Coordinator

Mary Irish

### Library

Librarian, Jane Cole

### Gift Shop

Manager, Mary Ann Fox  
Assistant Manager, Carol Merryfield  
Lynn Trainum

### Security/Maintenance

|                                     |               |
|-------------------------------------|---------------|
| Facilities Manager, Robert Gregoire |               |
| Jeffrey Landreth                    | Kay Starett   |
| John Phillips                       | Carla Carter  |
| Robert Burnett                      | Shahidul Alam |
| Ron Christofferson                  | Arthur Pizzo  |
| Bill Birdwell                       | Ray Berger    |

### Agave Magazine

Editor, Sondra Mesnik  
Contributors, Judy L. Mielke, Steve Priebe,  
Ruth Greenhouse, Suzanne Robichaux,  
Deborah Aitkin  
Design, Daryll Mackey

# TREES ... IN A DESERT

by Robert G. Breunig, Ph.D.  
Executive Director

On Earth Day 1990, Mayor Paul Johnson, in a major new initiative for the City of Phoenix, proposed the planting of one million trees by 1995.

That proposal sparked an immediate enthusiastic public response. Suddenly, there was a new vision for Phoenix — a vision of a city buffered and shaded by a green, cooling canopy of trees. "But wait," some said, "this is a desert. How can we conserve water if we plant a million trees?" And into my office came telephone calls from a skeptical press wondering how the city can promote desert landscaping on one hand and the planting of a million trees on the other. The very question revealed a fundamental misunderstanding about desert landscaping, the role of trees in a desert city and the Sonoran Desert itself.

In our culture the term *desert* has connotations of emptiness. In the popular imagination, deserts are places nearly devoid of woody vegetation. This misconception is revealed in thousands of so-called "desert landscapes" that have been installed around our city—landscapes consisting of gravel yards punctuated by a lonely cactus or two. Somehow, to many people, the term "desert landscape" and the word "trees" have become mutually exclusive. But as a stroll through the upland Sonoran Desert will reveal, this conception is far from the truth. The Sonoran Desert, and other deserts of the world, are rich with trees. And that richness can become a part of the character of our city.

But why plant trees? As hot as it already is, Phoenix is growing even warmer. The mean nighttime summer low temperature has risen two degrees for every decade in the last forty years. This is a dramatic warming rate, and as it continues our summers will become less livable. As we add more

streets, parking lots, sidewalks and buildings to our city they absorb heat by day and release it back well into the night.

One of the most effective ways to reverse this trend is to plant trees. Trees shade our hard urban surfaces from the sun's rays and also cool the air through transpiration. One University of Arizona study has suggested that properly placed trees can reduce the summertime energy demand on a home from 25 to 30%. Trees also directly remove carbon dioxide, the greenhouse gas, from the air. By reducing energy demand, planting trees also results in lower carbon dioxide production at fossil fuel burning plants.

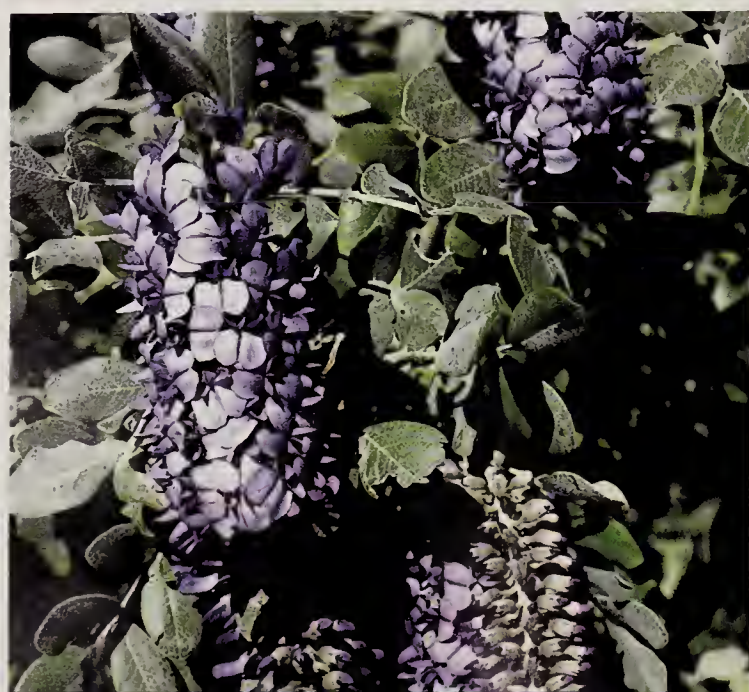
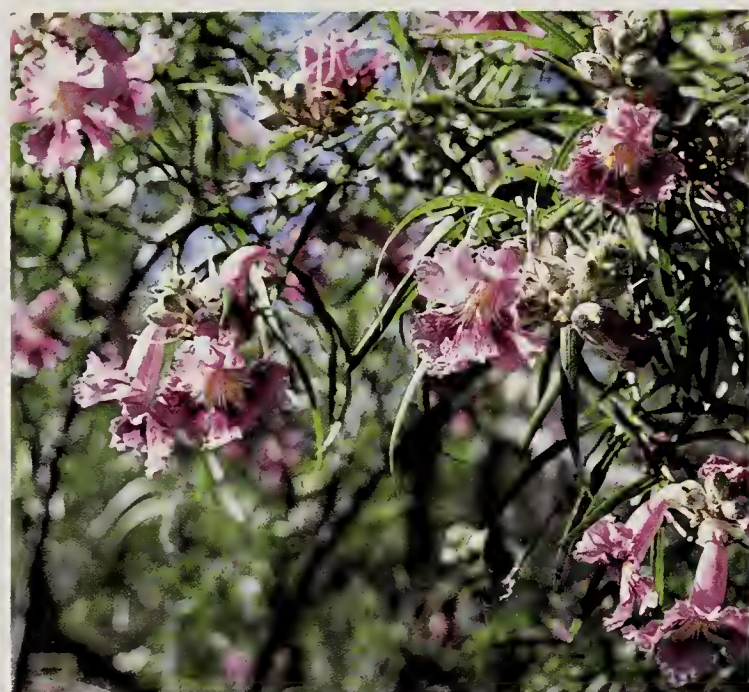
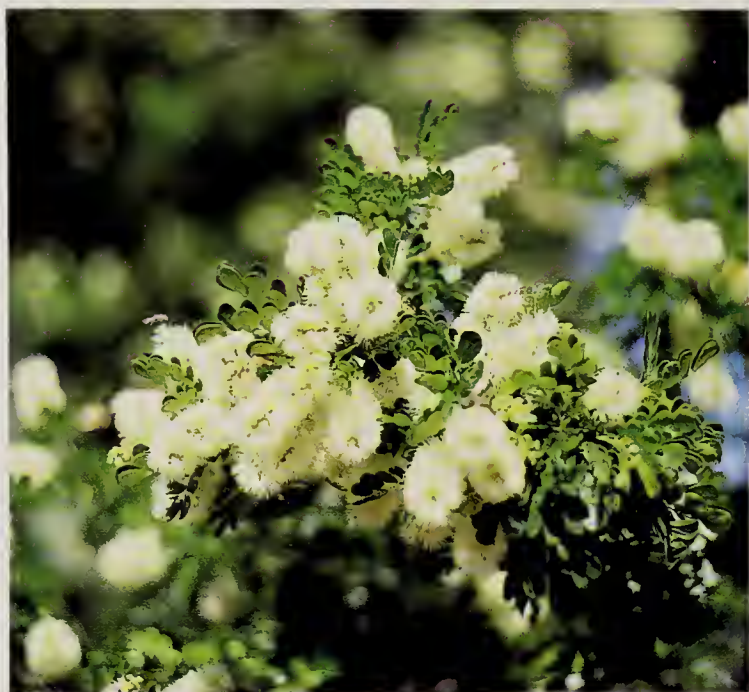
Why *desert* trees? Desert trees, especially native trees, are adapted to the rigors of our climate. Once established they need only minimal amounts of water. A yard graced with desert trees and shrubs provides much more cooling shade and uses far less water than a similar yard covered with grass.

But here's the greatest benefit of all. Desert trees, especially some of our native Sonoran Desert trees, are simply beautiful. They grow to a size and form that is perfectly adapted to the needs of our community. They tend to be low and broad. Their scale is just right for one-story homes found throughout Phoenix, and their broad canopies make them perfectly suited for their role as shade providers. They are pleasant to sit under on a warm day, and many species have magnificent flower blooms.

Widespread use of desert trees, especially natives, will give our city a sense of connection to the Sonoran Desert around us and will visually unify our community. They will give our region a unique identity and make Phoenix a memorable and more comfortable place live. Paul Johnson's dream deserves to become a reality — so that every day can be a Sonoran Desert Earth Day in Phoenix. ■

*This graceful desert willow (Chilopsis linearis)  
is as much a part of the natural Sonoran  
Desert landscape as the saguaro.*





Photos on left, top to bottom: ironwood flower and ironwood tree in bloom, Texas ebony flower and Texas ebony in bloom, desert willow flower and desert willow in bloom, Texas mountain laurel flower and Texas mountain laurel in bloom.



Fern-of-the-desert flower

Along with an increased use of drought-tolerant plants in landscape design, there has been a growing interest in native trees for decorative use and for shade. The palo verde and mesquite are commonly seen in both residential and commercial plantings. In fact, the nearly exclusive use of palo verde and mesquite in many landscapes may lead to an erroneous perception. While both these trees are, indeed, dominant in the natural environment, the Southwest has a great diversity of species from which to choose, especially when shopping for shade.

The ironwood (*Olneya tesota*) is another native of our southwest desert and presently is not used extensively as a shade tree. Evergreen, its lush gray-green foliage makes it an excellent landscape centerpiece. Though slow-growing, it reaches a height of 30 feet with a crown of equal width. The branches have small but sharp thorns. Ironwoods are easily transplanted and boxed specimens are available. When a mature ironwood is in

# DESERT NATIVES ... BEAUTIFUL AND PRACTICAL



*The feathery-shaped, medium green leaves of fern-of-the-desert, or feather tree, give this plant a lush, almost tropical appearance.*

full bloom, its lavender-pink flowers set against the brilliant blue of the May sky are a striking sight.

One of the loveliest contributions from the Sonoran Desert to the world of deciduous trees is the desert willow (*Chilopsis linearis*). Although similar in form and shape, this tree is not a true willow. Its pink to lavender orchid-like flowers begin blooming in early summer and last until early fall. Desert willow loses its long, slender leaves in the winter. During this period its appearance is least appealing, like the winter-dormant trees of eastern forests, although the absence of leaves allows the warming sun through its open branches.

Texas ebony (*Pithecellobium flexicaule*) lends itself readily as a year-round shade tree. Native to Texas and New Mexico, it is a slow to moderately fast-growing tree that will reach 20 feet under favorable conditions. Small, shiny, dark green leaves give it a more lush appearance than most southwestern desert trees. The unusual zig-zag pattern of its branches makes it a conversation piece as well. It blossoms in

spring and sporadically throughout summer with fragrant, cream-colored flowers followed by ornamental, woody pods. Texas ebony tolerates our heat and drought conditions well and loses its leaves only in the coldest winters.

Another native of Texas and New Mexico, Texas mountain laurel, or mescal bean (*Sophora secundiflora*), is a tree worth waiting for. Slow-growing, it can be trained into a tree up to 20 feet tall. Evergreen, its glossy green pairs of leaves are a welcome winter sight. Texas mountain laurel produces fragrant violet-blue flowers in wisteria-like clusters in early spring. Although the seeds are poisonous, they are so hard-coated that it is believed that they will pass harmlessly through the digestive system if ingested. If this is a concern, the pods can be easily removed before the seeds ripen. Texas mountain laurel thrives in our alkaline soils and tolerates extremes of heat and cold as well as drought. Truly a handsome tree and generally overlooked, it is worthy of planting now for the future.

Fern-of-the-desert, or feather tree (*Lysiloma thornberi*), normally a multi-stemmed large shrub, can be easily pruned into a small tree. Moderately fast growing, the large, feathery-shaped, medium green leaves give this plant a very lush, almost tropical appearance. It bears creamy white flowers in spring. A Sonoran Desert native, it is cold-hardy, though it will drop its leaves when temperatures reach the mid-twenties. Though it reaches a height of only 15 feet, its dense foliage provides ample shade. It can be very striking as a small patio tree, and several plants grouped together make a very effective screen.

*Tecoma stans*, Arizona yellow bells, or trumpet bush, is a multi-stemmed large shrub with opposite leaves comprised of shiny leaflets. In frost-free areas, this plant can grow into a medium-sized tree. Golden-yellow, trumpet-shaped flowers begin to bloom in late April and continue sporadically until late in the year. ■

# THE PALOVERDES ... GREEN AND GLORIOUS

**P**aloverde trees bring a splash of color to the Sonoran Desert in springtime. Their small flowers are not showy by themselves, but en masse they transform the tree into a glowing bouquet of yellow.

The blue paloverde (*Cercidium floridum*) is the first to bloom, beginning in mid-March and continuing through April. Small, round green buds unfold to reveal the five-petaled, bright yellow flower. Following the flower, a flat, 3 inch long seed pod forms. Blue paloverde gets its common name from the bluish tint of its leaves and bark. This tree has a wide-spreading, rounded shape, growing to 25 feet high and 30 feet wide. It occurs in southern Arizona, southeast California and northern Mexico, where it usually grows in valleys and along washes.

Like all *Cercidium* species, blue paloverde's branches and trunk contain chlorophyll, enabling the tree to photosynthesize even when it drops its leaves due to drought or cold. Paloverde, which means "green stick" in Spanish, is a very descriptive name indeed.

The littleleaf paloverde (*Cercidium microphyllum*) has the same geographical range as blue paloverde, but it tends to grow in rocky foothills and on mesas. This preference for hillsides accounts for its common name, foothills paloverde. As the specific epithet *microphyllum* (which means little leaf) suggests, one of this tree's characteristic features is tiny leaves. The oval leaflets are arranged in pairs along the inch-long midrib, or rachis. Both the leaves and branches have a yellowish-green cast, resulting in yet another common name — yellow paloverde. Littleleaf paloverde is a relatively small tree, 15 feet high and 20 feet wide. This paloverde blooms in April and early May, a bit later than the blue paloverde. The flowers are light yellow, and one of the five petals is light cream or white. The pods are about 3 inches long and tightly constricted between the seeds. The immature seeds of blue and littleleaf paloverde can be eaten like green peas,



either fresh or cooked, and Native Americans ground the dried seed into flour.

Palo brea (*Cercidium praecox*) has a unique umbrella-like branching pattern. The foliage and trunk are light green in color, and the leaflets are bigger than either the blue or littleleaf paloverde. Bright yellow flowers appear in April and May, followed by reddish-brown, papery seed pods. This native of Sonora and Baja California, Mexico grows to 25 feet high and 30 feet wide.

These three paloverdes are well suited to desert landscapes. They can be used as specimen trees, as patio trees to provide filtered shade, or massed as a grove. The spring bloom is a most attractive feature, as is the finely textured foliage. Once established, the paloverdes can survive on the natural rainfall. However, they'll grow faster and have a more lush appearance if given occasional supplemental irrigation, especially during the hottest summer months. Tolerant of a wide range of soils, paloverdes are also cold hardy to about 20 degrees F. ■

The palo brea has an unusual umbrella-like branching pattern. It will reach a height of twenty-five feet with a thirty-foot canopy.

The immature seeds of the blue and littleleaf paloverde trees can be eaten like green peas, either fresh or cooked.



For the desert landscaper, plants from the *Acacia* family offer a wide variety of forms, including trees, shrubs and even groundcovers, that fill almost any design requirement. Recent studies indicate that there may be more than 1,000 species of acacia. They are widely distributed throughout the world, but they are most commonly found in arid or semi-arid regions, making many of them well-adapted for growing in the desert



The fragrant, yellow puff-ball flowers of the sweet acacia appear in profusion in both spring and fall.

The sweet acacia is a fast-growing tree that provides pleasant filtered shade.

climate of central and southern Arizona. With the exception of Australian species, most acacias have leathery leaves composed of small leaflets, giving them a light airy appearance that seems quite natural in a desert landscape setting. The fuzzy acacia flowers (called catkins) are composed of multiple yellow or white stamens and are either ball-shaped or form an elongated spike.

For the homeowner who prefers to use plants native to the Sonoran Desert, there are several species from which to choose. *Acacia greggii*, catclaw acacia, is native to central and southern Arizona. Its small hooked thorns look like the claws of a cat, hence its common name. This acacia is a small tree which is usually shrub-like in appearance in its natural setting. However, with regular prunings it will develop into a canopy tree up to ten feet tall. It has a dark, rough bark and produces elongated spikes of cream-colored flowers in late spring or early summer. Because catclaw is native to this area, it is hardy and requires only an occasional deep soaking for growth.

The sweet acacia (*Acacia smallii* or *A. minuta*) is one of the most frequently utilized trees in recent landscape designs. It has extremely fragrant yellow flowers that bloom in profusion in both spring and

fall. It is a fast-growing tree when given supplemental water and it tolerates alkaline desert soils. Left alone, it tends towards multiple trunks which give it a shrubby appearance but it, too, can be pruned into a single-trunk tree with a wide canopy that provides pleasant filtered shade. The cold-hardy sweet acacia has a natural range extending from California to Texas and south into Mexico and Central America. It can reach a height of 35 feet, but in desert soils it is more likely to grow to 25 feet with a canopy as wide.

*Acacia schaffneri*, twisted acacia, is native to the Chihuahuan Desert but grows well in central Arizona. Distinctive because of its twisted and gnarled limbs, it lends an exotic character to the landscape design. Evergreen except in extreme cold and slightly smaller than the sweet acacia, it grows to a height of about 20 feet.

*Acacia willardiana* bears a surprising similarity to the Australian acacias. The likeness is in the leaf, which gives the tree a very light and willowy appearance. It has yellow ball-shaped flowers and velvety seed pods. Called "palo blanco" (white stick) in Mexico, *Acacia willardiana* has a thin, papery white outer bark. The tree reaches a height of 25 feet and is an excellent ornamental accent tree for a small patio area. This drought-tolerant, deciduous tree is native to Sonora and Baja California. It is somewhat frost tender in colder Valley locations.

Australian acacias are characterized by the elongated leaf stalks called phyllodes. These evergreens often have a willowy appearance. *Acacia stenophylla*, shoestring acacia, is a graceful, non-thorny example of an Australian tree acacia which is ideal for poolscape because it doesn't produce leaf litter.

You can see mature examples of these and many other acacia varieties at the Desert Botanical Garden. In our Landscape Demonstration Garden we exhibit several varieties including *Acacia smallii*, *A. schaffneri* and *A. redolens*. *Acacia willardiana* is displayed on the patio outside Webster Auditorium.



# ACACIA ... A TRUE DESERT DWELLER

The most intense solar heating occurs upon southern and western exposures. Tough, desert-adapted trees thrive in these locations. Among the most popular and attractive of these are the mesquites, because they are fast-growing, can reach a height of twenty to thirty feet and may have a canopy as wide, or wider, providing lots of shade.

The recent popularity of mesquite is interesting and rather ironic, because in the past it was much maligned. In Texas, New Mexico and Arizona this tree has been blacklisted by cattle ranchers because it proliferates in overgrazed grasslands, robs the grasses of moisture and eventually replaces the grassland as a mesquite forest. For a while, ranchers feared that it would take over the entire Southwest.

Several years ago, a Texan thought of chopping down mesquites to make charcoal for cooking. He found a ready market in the midwest and on the east coast, and this is now a million dollar a year business. During this same period, rapid urban development in the sunbelt led to the razing of mesquite thickets. The lowering of the water table due to ground-water pumping has also contributed to the demise of mesquites.

Mesquites belong to the genus *Prosopis*, which is in the pea family, or Leguminosae. The scientific taxonomy of individual species has had as many ups and downs as its popularity. For example, there are 45 species of mesquite with worldwide distribution. However, only four species occur in Asia and Africa. Most (35) species are found in South America and nine are native to North America. Of these nine, only three are native to Arizona: honey mesquite (*Prosopis glandulosa*), velvet mesquite (*P. velutina*), and screwbean mesquite (*P. pubescens*).

At least some of the confusion in identifying these plants lies in the fact that they readily hybridize. For example, a mesquite with long, stout thorns may cross with a mesquite that has no thorns at all. Some of the trees that develop from this type of cross may look somewhat like either parent, but most will probably have a moderately sized thorn and look not quite like either parent. After generations of this, the variations become greater and greater, as does the difficulty in

# THE MESQUITE... A SHADY CHARACTER

distinguishing individual species.

Most mesquites have significant characteristics in common. They grow to 30 feet tall and 30 or more feet wide, have similar flowers and fruits (except the screwbean mesquite), and all have similar leaves, though there are subtle differences. These trees are often multi-stemmed, with branches that curve gracefully and may even sweep the ground. Mesquite takes pruning well and can be pruned to a single trunk.

The Chilean mesquite is evergreen except in the coldest winters. Others are deciduous and will lose their pinnate leaves in the winter. The medium green leaves will appear again in the spring when temperatures warm up. In fact, the leafing out of the mesquites has been considered a sign that there would be no more frost that year.

Newly planted mesquites require supplemental water until they are established, which may take from one to three years. During this period they may grow as much as six feet per year. As the trees mature, the growth rate will slow down.

The one factor that may affect your choice of mesquite trees is the presence and size of thorns. If you want a thornless tree, consider *Prosopis chilensis*, Chilean mesquite. It currently enjoys wide popularity because it does so well here and usually has no thorns at all.

The Argentine mesquite, *Prosopis alba*, has the stoutest thorns, which can be 2-3 inches long. The thorns of the native mesquites are less stout and much shorter, usually 1/2-1 inch long.

Mesquites produce cream colored flowers throughout the spring, summer and fall, though the heaviest bloom is usually in the spring. The flowers are insect pollinated, frequently by bees, and this is another factor you may want to consider when deciding whether, or where, to include a mesquite tree in your home landscape. ■



With a little supplemental irrigation during the summer, a mesquite can grow as fast as six feet per year. A mature mesquite tree will be as wide as the tree is tall. The velvet mesquite is the most common in the Southwest.

Mesquite *bosques* (Spanish for small forests) reach their peak development near desert rivers or where their long roots can reach groundwater. They were more common a century ago, before rivers were dammed and groundwater was pumped. Mesquite *bosques* have also diminished because the trees were cut for timber and fuel or aggressively cleared for agriculture or pasture. Remnants of mesquite *bosques* can still be seen in Arizona along the Verde and other desert

# THE MESQUITE... THE TREE OF LIFE



Three years, mesquite trees may grow as much as a height of thirty feet with a dense canopy (above) is one of three varieties native to Arizona.

rivers. Here in Phoenix you will find an example of a mesquite bosque at the Desert Botanical Garden on our new exhibit trail, *Plants and People of the Sonoran Desert*.

Many desert animals make their homes in shady mesquite bosques. Birds, including doves and great horned owls, nest in the upper branches. Gambel's quail and road-runners nest on the floor. Pocket mice like to burrow in the sandy, rock-free soil beneath mesquites. Jackrabbits, kangaroo rats, foxes, skunks and other mammals also find shelter here.

Quail eat the young, feathery leaves that develop when the trees break their winter dormancy. In April, creamy yellow mesquite flowers provide one of the richest sources of pollen and nectar. The pollinators who visit the flowers include spiders, beetles, moths and more than 160 species of bees native to the Southwest.

The tiny mesquite flowers are crowded onto long spikes called catkins. While the principal bloom normally occurs in spring, after a winter rainy season, a second bloom of lesser intensity may occur later in response to the summer monsoon.

When pollinated, the flowers form little green fruits that resemble string beans. These grow and mature through the summer months. The ripe beans are tan or streaked with red, and are sweet to the taste. A second harvest of mesquite beans is usually possible in the fall as a result of the summer bloom. That's why you sometimes see mesquite beans persisting on some trees well into winter.

The beans can be eaten at all stages of their growth. They are especially favored by jackrabbits, pocket mice, kangaroo rats and packrats. Small bruchid beetles lay their eggs on mesquite beans so that the larva can bore through the pod into the seed where they pupate. The mature beetle then eats its way out of the seed and pod, leaving the little holes so often seen on mesquite beans.

Ripe bean pods were an important food staple for many native peoples of the Southwest because the large quantities available each summer are easily gathered and stored for year-round use. The sweet, fleshy mesocarp of the pod (not the seed) is the part most commonly utilized. It is pleasantly sweet, though beans from different trees vary in flavor. They are often described as tasting like cinnamon, lemon or vanilla. Undesirable beans may taste slightly soapy or sour.

Ripe mesquite beans can be ground and seeds sifted out to produce a fine, sweet

flour which can be mixed with water to make a drink, or added to bread, cereals or other foods. You can try grinding the dry beans in your blender, sifting out the seeds, and substituting it for one-fourth of the flour in your favorite cookie or bread recipe. If you don't plan to use the beans right away, keep them in the freezer or bake them at 150 degrees for three hours before storing.

The beans can also be simmered until soft and then strained. The resulting broth is sweet and nutritious. A delicious jelly can be made from the broth of simmered mesquite beans. In earlier times, mesquite beans were used to flavor and enrich winter squash, barrel cactus, or dumplings by layering these foods with the beans and simmering slowly.

The hard wood of mesquite is not only an important fuel but is also the main source of lumber in the desert. Mesquite timbers were the major supports for houses and ramadas built by desert dwellers. With the introduction of livestock by the Spanish, mesquite timber was used for fencing and corrals. The wood was also used to make tools and household implements. Many examples of how mesquite wood was used in the construction of authentic, traditional structures and fences can be seen during a visit to the Desert Botanical Garden.

Mesquite trees exude a multi-purpose, dark-colored sap through their shaggy black bark. Mixed with clean river clay and plastered to the hair, it was said to have been excellent black dye, shampoo and conditioner. Strips of the pitch-colored bark can be boiled and strained to make paint, the same kind that was used to decorate Maricopa and O'odham pottery.

During the warm months, globules of amber sap can be collected from mesquite branches. Similar in texture to gum arabic, the sap has a long history of medicinal use by native desert dwellers. A soothing gargle for sore throats is made by dissolving it in water. This mixture has also been drunk to remedy stomach ailments and other ills. Sometimes the sap is applied directly to wounds.

If you are interested in learning more about mesquite and other useful desert plants, come out to the Garden and visit the *Plants and People of the Sonoran Desert* exhibit. Excellent signs and a special trail guide provide a wealth of information. ■

## NON-NATIVE TREES



*Shoestring acacia (Acacia stenophylla) is a graceful, non-thorny Australian tree that is well-suited for planting near a pool because it doesn't produce leaf litter.*

**I**n this magazine we have limited our coverage to trees that are native either to the Sonoran Desert or the neighboring Chihuahuan Desert. It is our hope that in the future, streetscapes, parks and other public areas will feature these native trees to define our image as a desert city.

However, there are some non-native, drought-tolerant trees that may be used for other landscape applications. When selecting from these trees, the following criteria should be considered:

- Low water use
- Cold hardy
- Heat tolerant
- Shade canopy
- Aesthetics
- Local availability

Keep the characteristics of each tree in mind when making your selection for a particular purpose and location. Consider the ultimate height and canopy size to determine the proper distance from the house and whether it should be planted near power lines, driveways or sidewalks. Trees with sharp thorns or low-growing branches generally should not be planted in high-traffic areas. Trees that produce litter — leaf drop, flowers or fruits — may be less desirable near a swimming pool.



# TREES ADD COMFORT AND BEAUTY TO URBAN LANDSCAPES



*In an otherwise deserted parking lot, Valley shoppers create an island of parked cars in the shade of a few mesquite trees.*

by Judy L. Mielke

**T**rees make summertime in a desert city a little easier to bear. We all know the feeling of returning to a hot car after a visit to the grocery store or shopping mall. Even a short duration in those seas of asphalt known as parking lots can transform a car into an oven, unless, of course, we are fortunate enough to find a parking space shaded by a tree. Recently, I

saw a shopping center parking lot that clearly showed the attraction of shade. Like metal filings drawn to a magnet, nearly all the cars in the parking lot were clustered under a few mesquite trees. The owners of those cars would return to a merely warm car, a big improvement over one so hot that the steering wheel burns your hands.

The words "attractive" and "pleasant" are not normally linked with "parking lot", but the Desert Botanical Garden hopes to

change that. Our newly expanded visitor parking lot features planting islands with colorful desert shrubs and inviting shade trees. Chilean mesquite (*Prosopis chilensis*) and palo brea (*Cercidium praecox*) were chosen for their broad canopy and moderate to fast growth rate. The large boxed specimens that we planted will create almost instant shade.

Dr. Robert Breunig, executive director of the Desert Botanical Garden, is hopeful that this concept in parking lot design will

serve as a prototype for future projects throughout the metropolitan area. He envisions the Desert Botanical Garden parking lot as a sea of green, punctuated with flowers and alive with hummingbirds. "If you have to have parking lots, this is the best you can do," commented Breunig. A long-term solution to the proliferation of parking lots, suggests Dr. Breunig, is an effective mass-transit system to reduce our dependence on automobiles.

Aesthetics notwithstanding, asphalt-covered areas pose another problem in the city. Asphalt, along with concrete, absorbs and retains tremendous amounts of heat during the day, which is then reradiated at night. Between 1948 and 1984, nighttime summer temperatures at Sky Harbor Airport increased an average of two degrees Fahrenheit each decade. The highest nighttime low ever recorded in Phoenix (94 degrees F.) occurred during the summer of 1990.

The term "urban heat island" has been coined to describe the warming of cities caused by the combined effect of automobile exhaust, industrial emissions, and heat-retaining building and paving materials. Temperatures in urban areas can be as much as ten degrees F. higher than the surrounding countryside.

Trees can help counteract the urban heat island effect. Like giant evaporative coolers, trees lower the air temperature when they transpire (lose moisture).

Early settlers in the Valley knew the value of trees for cooling — just observe the dense plantings in the city's older neighborhoods. Recent computer model studies at California's Lawrence Berkeley Laboratory confirm this wisdom. According to the study, increased tree cover (e.g., increased evapotranspiration) in the general neighborhood of an "average" Phoenix house could be expected to reduce the energy used for cooling by 25% annually. Locating the trees near enough to shade the house itself would reduce cooling energy requirements by an additional 8%. Researchers at the Lawrence Berkeley Laboratory conclude that if each household in Phoenix planted three trees, the annual cost for air conditioning could be cut by about a third.

Because intense sunlight is a dominant factor influencing our desert climate, the shade cast by a tree may have an even greater effect on overall cooling than just that same tree's evapotranspiration, says Greg McPherson, an assistant professor

with the University of Arizona Department of Landscape Architecture. McPherson maintains that our hot, dry climate diminishes the benefit of evapotranspiration. His research has determined that shade trees on the eastern and western exposures of a Phoenix home could reduce summertime energy consumption for cooling by 30%. Dense shade cast on all surfaces of an energy-efficient home in Tucson could save 46% in yearly cooling costs.

McPherson recommends planting trees with spreading canopies and dense foliage, as opposed to tall, columnar trees. The water-thrifty native and hybrid mesquites and palo verdes would be two good choices.

“Plants provide a sense of connection with nature, which helps us to cope with the unnatural environment imposed by the city.”

The aesthetic and psychological value of trees in an urban setting should not be overlooked. Plants provide a sense of connection with nature, which helps us to cope with the unnatural environment imposed by the city. Much of the urban environment is on a massive scale, and at times the sheer size and bulk of the buildings and freeways can be overwhelming. Trees are a valuable design tool for lending human scale to our cities.

Before modern civilization reached the Salt River Valley, much of the area was covered with dense stands of mesquite trees, known as *bosques*. Translated from Spanish, *bosque* (bos-kay) means "forest". A small corner of Papago Park at the intersection of Curry and College Roads in Tempe has a remnant mesquite *bosque*. The trees create a dense and inviting shade, and the gnarled branches are better

for climbing than any man-made gym.

The very identity of a city can be defined by its trees. Who doesn't associate Los Angeles or Miami with palm trees, or Seattle with lush, evergreen trees? In a recent interview published in *Landscape Architecture*, Darrel Morrison, dean of the School of Environmental Design at the University of Georgia, stressed the importance of utilizing native trees, both for their hardiness and the regional character they provide. "We need always to be looking at the palette of local plants that may be adapted to urban conditions," said Morrison.

Phoenix is the largest metropolitan area in the Sonoran Desert, and as such, has a unique opportunity to showcase the distinctive plant materials of this region and create a special identity for the city. The Valley's civic leaders are embracing this idea, and Sonoran Desert landscapes will soon be appearing in some highly visible locations. Travelers arriving at Sky Harbor Airport's new Terminal Four will be surrounded by such characteristic Sonoran Desert plants as mesquite, palo verde, fairy duster, chuparosa, ocotillo and saguaro. Plans call for phasing in Sonoran Desert plants at the other terminal buildings. The Desert Botanical Garden provided assistance with the overall design concept and selection of plant materials for the airport project, as well as for the newly renovated landscape at the Phoenix City Hall building downtown.

The new landscape plantings along Central Avenue will also have a Sonoran flavor. Last year, a citizens' committee appointed by Mayor Goddard recommended planting palo brea trees rather than the exotic (non-native) trees proposed in the original streetscape plan. In the committee's view, Central Avenue's importance as the major thoroughfare in downtown Phoenix called for a streetscape showcasing the unique beauty of the Sonoran Desert.

The distinctive lime green trunk of palo brea (*Cercidium praecox*) will provide a visual treat to pedestrians and commuters alike. Welcome shade is cast by the tree's broad, umbrella-shaped canopy in summer; then the foliage thins during winter, allowing the sun's warming rays to pass through. In spring, a profusion of yellow blossoms will brighten the Central Avenue corridor. So striking is the palo brea's flowering that during the citizens'



The grove of Sonoran Desert trees on Ullman Terrace at the Desert Botanical Garden is a perfect example of how well-suited native trees are as shade providers. They tend to be low and broad, and they are pleasant to sit under on a warm day.

committee discussion it was suggested that the Central Avenue tree plantings may one day be as well known as the cherry trees of Washington, D.C.

Growing trees in the city presents some unique challenges: the roots may have only a small pocket of soil in which to grow; automobile exhaust fills the air; skyscrapers block the sun; and vandalism is an ever-present threat. Urban Horticulture, a relatively new discipline, has developed in response to the special challenges created by the urban environment. Much work remains to be done, but urban horticulturists are learning which trees will tolerate the harsh environment of the city, and how best to grow those trees.

Aside from developing cultural information, urban horticulturists are looking at alternative ways of designing

with trees in the urban setting. Dr. Nina Bassuk, assistant professor and director of the Urban Horticulture Institute, New York State College of Agriculture and Life Sciences, Cornell University, advocates grouping trees, rather than planting individuals in the traditional straight row. Writing in *Garden*, Dr. Bassuk mentions the cultural and aesthetic benefits of clustering trees, and adds, "Grouped plantings would also allow us to use a much more diverse palette of plants — those that do not now conform to the formal, standard 'lollipop' tree that we envision lining our streets. We could use multi-stemmed, informally shaped, so-called 'junk' or 'weed' trees and shrubs, such as Russian olive or alder, or even ailanthus — tough trees that might be inappropriate when planted singly but would be really

attractive when planted en masse.

"Those grouped plantings could be used in such areas as wide sidewalks, traffic islands, plazas, median strips and parking lots." While Dr. Bassuk used temperate plants for her examples, the Sonoran Desert flora likewise has trees that don't fit the "lollipop" mold, but could enrich our urban surroundings with their interesting textures, colors and fragrances. Two examples that come to mind are greythorn (*Zizyphus obtusifolia*), a large shrub/small tree with delicate, gray-green leaves, and desert willow (*Chilopsis linearis*) which fills the air with a pleasant, citrus-like fragrance in summer.

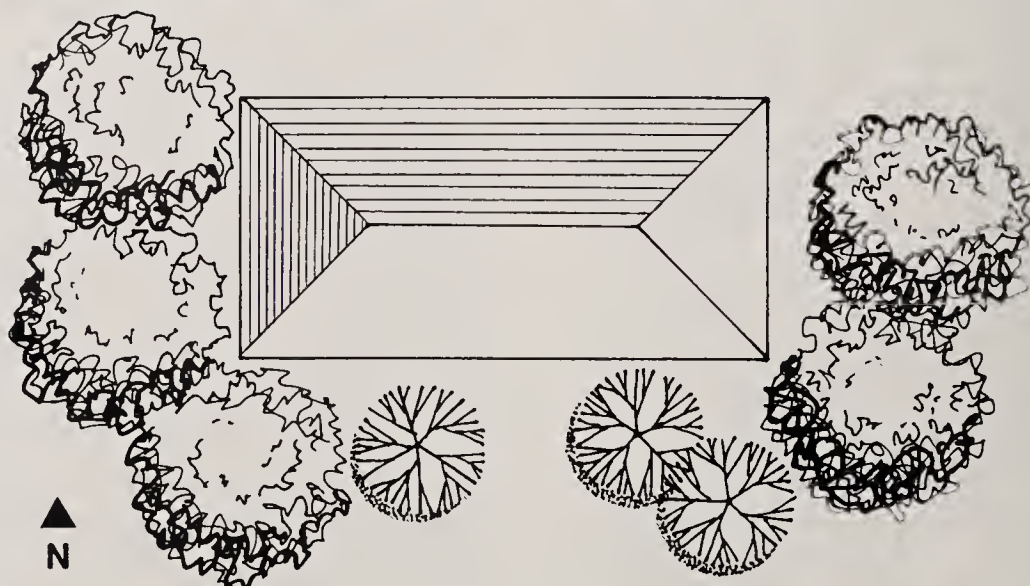
One of the most interesting aspects of city life is the rich mix of people. Let's encourage a similar diversity in our city's trees.



# TREE PLANTING TIPS

**P**lanting procedures are much the same no matter where you live. There is, however, one big difference when planting in the desert: the soil.

Our native soils are often compacted and rocky, and may be underlain by caliche (solidified calcium carbonate). This hard, light-colored rock can vary in depth from a few inches to several feet. Since neither roots nor water can penetrate caliche, it must be broken up and preferably removed. An ordinary shovel barely makes a dent in caliche. The most effective tools for breaking through it are picks and iron digging bars.



*Trees planted on a home's southern, eastern and western exposures provide the most protection from solar radiation. Deciduous trees create shade in summer, yet allow the sun's warmth to penetrate in winter.*

THE PLANTING HOLE:

Dig a generous hole that is at least twice the width and depth of the tree's container. For a five gallon tree, this would be about 30 inches wide and 30 inches deep. If your shovel hits something that looks and feels like a piece of buried sidewalk, you have encountered caliche. Follow the instructions to remove it.

DRAINAGE:

When you have finished digging the hole, fill it with water. This accomplishes two things: it will provide a moist environment for the new roots and it will indicate problems with drainage. Ideally, the water will soak into the ground quickly. If several hours have passed and there is still standing water, bail it out and dig deeper to check for a caliche layer.

BACKFILL:

You should provide a transition between the highly organic soil in the container and the native soil by mixing the soil from the hole with an equal amount of organic matter such as peat moss or forest mulch. In general, it is not necessary to fertilize newly transplanted trees. However, a slow-release fertilizer high in nitrogen and phosphorous can be added to the backfill.

PLANTING:

Gently remove the tree from the container and check the root ball. If the ball is very tight or the roots are wound in around themselves, free the roots gently, avoiding breakage. Position the plant in the hole so that the top of the root ball is level with the existing soil grade. Return the backfill to the hole, pressing the soil firmly around the root ball as you go.

WATERING:

It is important to water a newly planted tree immediately after planting. Either build a shallow basin around the tree and fill it with water or lay a hose, set at low volume, by the base and let it run for several hours. All newly planted plants, even desert natives, need to be kept regularly watered until they are well established.

PRUNING:

In the past, some horticulturists recommended pruning part of the new transplant's foliage to compensate for root damage suffered during the planting process. However, unless severe wilting

occurs, pruning shouldn't be necessary. In fact, recent studies suggest that compensatory pruning may actually slow a plant's recovery.

DESERT BOTANICAL GARDEN RESOURCES

The Garden has information and services available for individuals and landscape professionals through the following activities:

- **Plant Hotline**  
Call 941-1225 between 1:00 and 2:30, Monday through Friday, and a plant specialist will try to answer questions about desert plants or desert landscaping
- **Classes and Workshops**  
Regularly scheduled classes and workshops cover a variety of landscaping activities: basic desert landscaping; converting to a desert landscape; poolscapes; landscaping with native plants and other specialized subjects. Call for seasonal information about class schedules.
- **Landscaping Tours**  
Guided tours of the Garden's collection that focus on plants suitable for landscaping in the desert. Saturday mornings during Spring and Fall. Call for dates and times.
- **Annual Landscape & Flower Show**  
The second annual Landscape & Flower Show will be held at the Desert Botanical Garden on October 6-8. Sponsored by Phoenix Home & Garden Magazine, this is the largest show of its kind in Arizona, featuring showcase landscapes and

gardens, flowers, exhibits, garden accessories, seminars and demonstrations.

- **Spring and Fall Plant Sales**  
There is no charge for admission to the Garden's Plant Sales where we offer a large and varied selection of drought-tolerant landscape plants. Trees, shrubs, groundcovers, cacti and other succulents, all suitable for landscaping in the Valley, are offered for sale. There are many hard-to-find varieties, and Garden horticulturists are on hand to assist with selections and answer questions.
- **Planting Tips**  
The Garden has prepared a series of plant information sheets covering a range of subjects: They are available at the Gift Shop and the Sales Greenhouse, or by mail if a business size, stamped, self-addressed envelope is enclosed:
  - Planting Instructions for Desert Trees and Shrubs
  - Watering Instructions for Desert Trees and Shrubs
  - Planting Wildflowers
  - Getting Rid of a Bermuda Lawn
  - Treating Texas Root Rot
  - Care of Cacti and Succulents
  - Rooting a Cactus Cutting
  - Growing Cactus From Seed
  - Caring for Lithops
  - Plants that Attract Birds to your Yard
  - Recommended Plants for Desert Landscaping
- **Books**  
The Garden's Gift Shop offers a wide selection of books and other plant-related items for sale. Gift Shop hours are 9 a.m. until 5 p.m. daily.

WATERING SCHEDULE: TREES

| TEMPERATURE      | 1ST YEAR      | 2-5 YEARS*    | AFTER FIVE YEARS                                        |
|------------------|---------------|---------------|---------------------------------------------------------|
| over 100 degrees | once a week   | every 10 days | gradually extend intervals between waterings to 4 weeks |
| 90-100 degrees   | every 10 days | every 2 weeks | gradually extend intervals between waterings to 6 weeks |
| 75-90 degrees    | every 2 weeks | every 3 weeks | water if no rainfall for 60 days                        |
| below 75 degrees | every 30 days | every 30 days | water if no rainfall for 60 days                        |

\*Because trees take longer to mature than shrubs, the second year watering schedule is maintained for up to 5 years.

**DRIP IRRIGATION:** If you are using a drip irrigation system, be sure that the system runs at least two hours for each watering. This will ensure that the plant is being watered deeply. About every fifth watering, let the drip run for 8-10 hours. This will leach away any salts which have accumulated around the plant.



# Desert Botanical Garden

1201 N. Galvin Parkway  
Phoenix, AZ 85008  
602-941-1225

NONPROFIT ORG.  
U. S. POSTAGE  
**PAID**  
PHOENIX, ARIZONA  
PERMIT NO. 1269

Additional funding for this issue of AGAVE  
was provided by

## FORESTRY FOR PHOENIX 534-LEAF

A program of  
The American Forestry Association

*The blue paloverde tree adds a splash of color to the Sonoran Desert springtime. Its blossoms transform the tree into a glowing bouquet of yellow.*

